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Rippling, Wrinkling and Folding of Substrate-Supported Graphene



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ABSTRACT:

Using atomistic and continuum models we study morphological features of substrate-supported graphene to understand the transitions from rippling to wrinkling and to folding under thermomechanical conditions. First, a statistical mechanics analysis is presented to reveal the entropic effects of thermal rippling on van der Waals interactions between monolayer graphene and a rigid substrate. Subject to an in-plane compression, periodical wrinkles or localized buckles may develop, depending on the adhesive interactions. Under further compression, transitions from wrinkles to buckles and from buckles to folds are predicted. A morphological phase diagram is thus established to link the specific features to the interfacial properties of graphene, with potential impacts on other physical properties of graphene and its applications.

BIOGRAPHY:

Rui Huang is a professor of Aerospace Engineering and Engineering Mechanics at the University of Texas at Austin. He received his bachelor degree in 1994 from University of Science and Technology of China and his PhD in 2001 from Princeton University. He joined the faculty at the University of Texas at Austin in 2002. His research interests include mechanics of thin films, soft materials, nanomechanics, and mechanical reliability of advanced interconnects and packaging for microelectronics. He has published over 90 journal articles and 4 book chapters.